

**ECONOMIC MEASURES FOR
INTEGRATING THE ENVIRONMENT
AND THE ECONOMY IN BRITISH
COLUMBIA**

**Meyer Resources, Inc.
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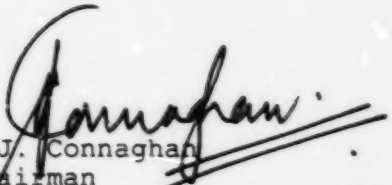
**Prepared For The British Columbia Round Table On The
Environment And The Economy**

**ROUND
TABLE**

PREFACE

"Economic Measures For Integrating The Environment And The Economy In British Columbia" was prepared by Meyer Resources Inc. at the request of the British Columbia Round Table on the Environment and the Economy. It is part of a series of background reports dealing with issues which Round Table considered important to the development of a sustainable development strategy in British Columbia. It is intended to provide information that will assist the dialogue between the Round Table and the public.

The Round Table has not endorsed the report. The information provided and conclusions reached in this document are those of the author.



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EXECUTIVE SUMMARY

Economic Measures For Integrating The Environment And The Economy In British Columbia

This background report focuses on the economic measures available to encourage environmentally sensitive behaviour. Examples are given of how permit fees, taxes, creation of markets, and subsidies can be used to establish these economic incentives. The paper also provides background on the current system of controls through regulation.

Programs to encourage sustainability will be constrained by things such as how the programs have an impact on B.C. firms internationally and the problem of putting dollar values on environmental concerns.

The author offers a list of actions available including:

- developing, implementing and testing several "emission trading systems";
- monitoring and conducting research identifying potential benefits and costs of "tradeable harvest permit systems";
- implementing rate structures that are progressive with respect to sustainability throughout British Columbia's system of financial incentives and disincentives;
- evaluating the potential for environmentally weighted pricing processes;
- developing a lead role for British Columbia regarding national and international sustainability of the economy and the environment;
- developing a provincial system of accounts that enables the Province to gauge how swiftly it can move toward a more sustainable economy and environment, while continuing to provide other essential services;
- improving the comprehensiveness and accuracy of non-market value information.

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I. Focus for this Discussion

The past several decades have seen unprecedented economic and technological growth in British Columbia. This growth has raised standards of living and satisfied a broad array of human needs.

These accomplishments have been achieved at a cost. The ability of British Columbia's natural environment and associated resources to support B.C.'s economy and style of living has deteriorated over the past decade. Forest extraction costs are higher and often produce lower yields. Mineral deposits are found at progressively more distant locations, adding to cost. Fish production is beset with problems of habitat deterioration. Productive farmland is under increasing pressure from urbanization. Tourists and British Columbians as well express concern over disturbance of the natural landscape and attendant threats to wildlife. Air and water pollution are impacting the Province on an unprecedented scale. These factors, and the attendant public insistence on more stringent environmental standards, threaten to diminish the natural resource base upon which British Columbia's economy rests. Some of these problems are related to the population at large (eg. air quality in Greater Vancouver, sewage non-treatment in Greater Victoria). Other problems can be principally related to a particular type of economic activity (eg. dioxin from pulp mills). It thus seems apparent that the interests of sustaining viable levels of economic activity and of sustaining acceptable quantities and qualities of British Columbia's lands, waters (fresh and salt), air and associated natural resources will converge and be increasingly interdependent over the coming decade.

In the Brundtland Report, it was concluded that "humanity has the ability to make development sustainable - to ensure it meets the needs of the present without compromising the ability of future generations to meet their own needs" (Our Common Future, Page 8). The challenge of meeting this definition of sustainability makes it clear that in order to secure the future of our economy and our environment we must not only repair past damage, but also secure the long term capability of the lands, water, air and ocean resources upon which both depend.

One potentially fruitful avenue for such initiative involves shifting the balance from traditional "command and control" regulation of economic activity in the Province toward a system that makes fuller use of the traditional "incentives driven" system of private markets for goods and services that exists in our economy - to encourage or facilitate economic behavior that is both more long term in perspective, and more environmentally sensitive. Underlying such an initiative is the presumption that for some private and public activity sectors, the self-interested forces of individual budget setting and private enterprise may be more effective than regulatory proscription for integrating economic and environmental interests in the Province.

II. Objectives for Sustainability in British Columbia

In considering economic measures to increase sustainability, it is critical to define the objectives that they are supposed to achieve. For purposes of initial discussion, a set of candidate objectives are listed in Table 1. It is expected that these objectives will be amended and/or refined as the work of the Round Table progresses.

Table 1Objectives for Sustainability in British Columbia

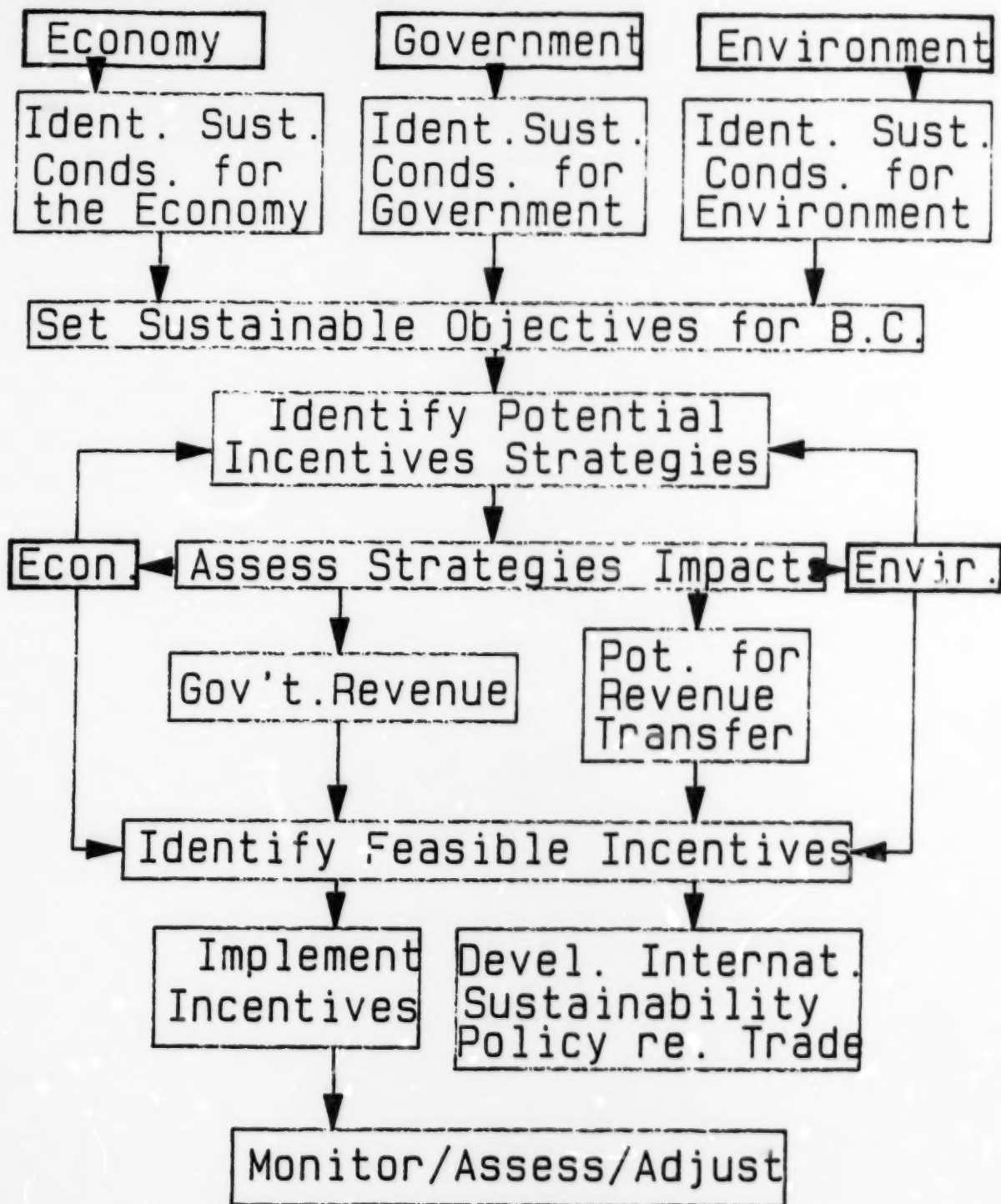
1. Sustain profitability and employment in the British Columbia economy over the next decade and beyond.
2. Sustain the basic health and capability for renewal of British Columbia's land, fresh water, air and ocean resources over the next decade and beyond.
3. Enable correction of existing serious pollution abuses.
4. Achieve objectives (1) through (3) in a manner that sustains the revenue capability of the Province to provide essential services to its citizens.

It is this author's view that these objectives should be pursued in an integrated manner. In fact, it may be that failure to more fully integrate concerns for environment into our market system in the past has contributed to the difficulties that B.C.'s land, water, air and ocean resources are now experiencing. The lesson to be learned here is that pursuit of a single objective at the expense of others will not sustain British Columbia in the future. Rather, better "balancing" between the economy and the environment seems the preferred future strategy. This may also mandate remedial action to correct serious imbalances that presently exist.

Finally, a strategy to increase sustainability in the Province will not be achieved in a few months, and must be viewed as a process. Such a process is illustrated in Figure 1. Particulars of this process will be discussed, as appropriate, in following sections of this paper.

Figure 1

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III. Creating Economic Markets to Improve Sustainability of British Columbia's Resources and Environment

Some economic theorists argue that the market place is an ideal forum to assist in achieving sustainability. Free exchange of goods and services, they assert, provide perfect, or near perfect, decisions incorporating the self-interest and knowledge of producers and consumers. Under such circumstances, the argument continues, all one needs to do to adequately deal with pollution, for example, is to "set up a market" to deal with pollutants. Conversely, it is argued that where pollution costs are not incorporated into markets, economic decision-making will continue to discount the environment.

Setting up markets for scarce resources, for pollutants, etc. raises two central issues: how such markets would function; and how prices would be established for environmental "goods" or "bads" in such markets. In this section of the paper, I discuss markets that are more or less self-regulating with respect to price setting. This is likely the preferred option among economists who argue that economic markets represent superior tools for improving sustainability of the economy and the environment in British Columbia. In following Section IV, I discuss intervention to affect environmental prices in existing markets.

1. Market Trading of Emission Control Credit Certificates.

A number of actions have been initiated outside B.C. to credit industries that emit less pollutants to the atmosphere than are required by ambient control standards, and to allow "market sales" of these credits to other companies who are unable to meet emission standards or who wish to expand their level of activity (and hence their total pollution loading) in the area. Overall

pollution control objectives in such systems are achieved via setting of the emission standard(s) upon which credits are based. This standard is related, in turn, to pollution loading objectives for the air shed as a whole.

Tietenberg (1985), speaking of trading in pollutant emission credits, identifies the following potential benefits from such a system.

- i) Firms at the forefront of pollutant control procedures will be able to recover part of their associated costs by selling pollution credits earned from overcompliance, and will be encouraged to proceed further with pollution control technology.
- ii) Emission certificates will be distributed between firms in the market in a more efficient way, lowering overall industry cost.
- iii) Firms would be more favorable to this market based form of regulation, and would comply with it more quickly.
- iv) Program administrative costs would be reduced to the extent that the emission control decisions of each company would now be made internally on the basis of least cost, removing the need for cost monitoring by the regulatory authority.
- v) Such a system allows for entry/exit and expansion/contraction of firms in an area, and is therefore superior to a system that establishes an absolute prohibition on increased emissions by any new or existing firm.

Experience to date with such a system has been generally positive. Perhaps the best documented system is the U.S. Environmental Protection Agency's air quality "bubble" system, presently in place in a number of air basins in the United States where air quality requires improvement. EPA first distinguishes between hazardous pollutants, judged immediately dangerous, which are dealt with stringently wherever they occur, and criteria pollutants which are used to typify environmental wellbeing and to which an ambient standards approach can be applied. A pollution

loadings capacity is then established for each criteria pollutant in the designated air basin, and an emission standard set, having regard for the total expected amount of pollution generating activity anticipated. Companies that emit less than the standard for any pollutant then receive the tradable emission credit certificates. Tietenberg, writing in 1985, informs us that the EPA program had resulted both in savings in cost to industry and in a reduction in compliance cost, but that improved speed of environmental compliance could not be clearly associated with the program. Finally, Tietenberg reports that market collusion among firms can considerably diminish the beneficial effects of such a system.

EPA has also recently promulgated a nationwide emission permits trading system to meet standards identified in the Montreal Protocol to the 1985 Vienna Convention for the Protection of the Ozone Layer (Stavins, 1989).

Finally, an EPA collaboration with the State of Colorado is noteworthy, in that it relates to control of nonpoint source pollution of waters rather than air. The program allows public sewage treatment entities to finance control of nonpoint pollution sources in lieu of upgrading their own effluent to drinking water standards - and is reported to be saving more than \$1 million per year while increasing the likelihood of achieving environmental improvements (Stavins, 1989).

2. Marketing Rights to Receive Water Allocations

The use of markets to reallocate water in the western United States has received considerable recent attention. In California, a short term market for such allocations has been established, whereby rights holders (particularly urban) retain their long term entitlement to water delivered from state and federal projects, but may sell water surplus to their immediate needs in any given year. Over time, as the "own" demand of senior rights holders increases, this market in water "surpluses" will diminish - but it currently plays a useful short term role in enabling water consumption by more junior rights holders.

The California Department of Fish and Game (CF&G), beset by water deficits for fish in a water-short California, has entered this spot market for surplus water as a buyer. This entry has raised two problems not evident in the previous discussion of emission credit markets. First, under the doctrine of Public Trust (Dunning, 1981), reaffirmed by the California Supreme Court in the Audobaun Society's lawsuit over Mono Lake, public interests such as fish and wildlife must be given balanced consideration along with private interests in allocating water. It is unclear as to whether CF&G, as custodian of that public trust, should act as purchaser of a resource to which it has a coequal right.

Second, at a more practical level, CF&G's purchasing power in the water market is limited by its budget. Even if it could fully value the worth of its fish in economic terms (the issue of valuation is discussed in a following section) it has no practical way of turning those values into hard cash. Consequently, it will

always be a weak bidder and receive an underallocation from the surplus water market.

3. Marketing Harvest Quota Rights

Markets where fishermen can buy and sell preassigned harvest quotas have been initiated in New Zealand and in Canada. Such market approaches claim much the same benefits as those discussed earlier. The federal Department of Fisheries and Oceans currently has a two year trial running to test such a system in the geoduck and sablefish fisheries in British Columbia. It is too early, however, to draw firm conclusions from these initiatives, either in Canada or elsewhere.

Recent experience with fisheries management in Hawaii highlights a useful caveat with respect to market systems for harvest quotas—namely, who will be permitted to participate in the market? The Western Pacific Regional Fisheries Management Council explicitly rejected a tradeable quota system for the Northwestern Hawaiian Islands bottomfishery after analysis determined that market leverage would alter the ownership composition of the fleet away from natives and other fishermen with a strong commitment to living in the Hawaiian Islands, toward corporations and non residents (Meyer, 1987).

4. Conclusions Respecting Marketing Systems to Increase Sustainability in British Columbia

This short paper does not present a comprehensive review of prior theory and experience with respect to market systems initiatives. Rather, I have briefly cited several examples which illustrate whether such a general approach may have promise in British Columbia, if so under what conditions, and with what

important caveats. On that basis, the following tentative conclusions are offered for discussion.

- i) Marketable permit systems can assist industry to meet mandated pollution or harvest control requirements in a manner that is more cost effective for both industry and government. The system will also allow individual firms production flexibility as pollution or harvest control proceeds. These benefits should be clearly evident in the short term. Over the longer term benefits will also likely be positive, but are less obvious.
- ii) Such systems will not work in areas of British Columbia where natural resources or the ambient environment are unstressed by human activity, for in such cases the price of the potentially tradeable permit would be zero.
- iii) Hazardous discharges (recall the EPA definition) should be handled by direct regulation, and not subjected to a market based system.
- iv) Any marketable permit system must be based on adequate and sustainable standards with respect to ambient environmental quality and the health of renewable resource stocks. Adequate environment is one of the objectives that a permit market can facilitate. There is no empirical evidence that permit markets will set such adequate standards if left to themselves, and it is unrealistic to expect that the custodians of acceptable environmental quality would be able to compete effectively in them (recall the difficulties of the California Department of Fish and Game).
- v) Finally, consideration of a market permit system must pose two other important questions, the answers to which will assist identification of potential benefits and costs for British Columbia. These are:

"What is the prospect that collusion by firms will act to subvert normal market forces, and what can be done to control such practices?"

"Who will be allowed to participate in the market, and what effect will this have on who may gain or lose from implementation of such a market system?"

IV. Adjusting Environmental Prices in Existing Markets - Taxes and Permit Fees

A second economic mechanism for improving the sustainability of British Columbia's economy and environment is to establish or increase prices associated with less sustainable behavior, and introduce them directly into the cost considerations that producers or consumers must face. This is most commonly achieved via the use of emission or harvest permit fees on the one hand, or via monetary penalties on the other. These initiatives do not leave the market "to work out its own solution", per the approaches discussed in previous Section III, but rather "force the market to adjust its behavior" to specific prices charged (by government) for environmental disamenities.

Two justifications are usually associated with such direct pricing intervention. First, it is argued on equity grounds that if society needs to monitor and control the actions of harvesters, polluters, etc., they should at least cover the cost of those activities through a permitting or fee system. A second argument goes further. It argues that if prices associated with unsustainable activities can be increased, the level of those activities will decline, and if these prices can be set at exactly the "right" level, an optimal balance between economic activity and environmental protection will be struck by producers and consumers. The first argument puts little in the way of informational pressure on the system. We simply need to know how much our system for monitoring, control and (where necessary) remedial action costs, and that the system is judged reasonably efficient by the elected persons in charge. The second rationale sets a far more rigorous informational test, however - the need to know the equivalent monetary value impacted when

polluting or similar non-sustaining activities occur.

Some costs of pollution or resource damage can be measured directly. For example, damage to structures from corrosive particulate matter in the air can be measured and costed. Similarly, costs when commercial shellfisheries must be closed due to sewage discharge can be assessed. ... and so on. However, some of the most profound effects of pollution/ resource destruction involve human concerns and values that are not traded in economic markets, and which consequently have no observable market price. These include concerns for human life and health, concerns for public recreation, concerns for style and place of living, concerns for fish and wildlife and general aesthetic appreciation of British Columbia's natural environment. Economists generally describe these concerns as non-market values.

Measurement of non-market values has benefitted from more than two decades of effort by economists. For early applied work in British Columbia, see, for example, Environment and Land Use Secretariat (1977); Meyer (1978); Quadra Economic Consultants (1978) and Meyer and Dodd (1978). For a contemporary assessment of the state of the art of non-market evaluation, see: British Columbia Utilities Commission (1983); Knetsch (1983); Desvouses and Skahen (1985); Bay Institute of San Francisco (1986); Bromley (1986); Federal Register (1986); Hogarth and Reder (1986); Meyer (1987); and Mitchell and Carson (1990). Five general conclusions may be drawn from these efforts.

- 1) Economists have developed and theoretically validated a set of non-market valuation tools that can be applied to real valuation problems. To quote Gardner M. Brown at a recent meeting of the Western Association for the Valuation of Ecosystems; "The economist's search for valid procedures is largely complete. What we now need is good data".

- ii) Economists continue debate regarding the accuracy of alternative non-market valuation procedures. This is largely a question of validation of data.
- iii) Spirited debate continues with respect to the appropriate assumptions that should underlie choice of non-market valuation procedure - particularly with respect to "willingness to pay" versus "fair compensation" issues. This debate is based on principles of law and of societal fairness, and has involved intensive lobbying by the private and public interests that might be affected. The economists role is most appropriately limited to estimating differential valuation results stemming from each of the legal/societal choices that are being considered.
- iv) Non-market economic data associated with costs of pollution or resource damage is limited in British Columbia, and this data base needs to be increased substantially.
- v) While a substantial increase in available non-market economic data will inform the debate on sustainability, and the discussion on non-market pricing in particular, it is unlikely that non-market economic valuation procedures will ever be able to completely capture public concerns over health, environment, etc. It follows that a system that incorporates "best non-market value data" into a decision process that weighs these data along with other imputed societal values will be required.

1. Excise Tax Interventions with Respect to Environmental Prices

Stone (1990a) provides a very useful review of prior excise tax initiatives in the Province together with selected other national and international examples. The excise tax information is summarised in Appendix Table A-1. Even restricting consideration to the limited examples provided by Stone, it is clear that taxes and fees that address sustainability for natural resources and the environment have been in common use throughout the world for some time, and that several of these have a history of prior implementation in British Columbia.

Readers seeking detail with respect to these initiatives are referred to Appendix Table A-1 and to Stone (1990a). Here I will pose tentative conclusions with respect to the potential

contribution that excise tax pricing initiatives in general can make to the sustainability of B.C.'s economy and environment, and note recent developments that offer particular promise of effectiveness. On that basis, and after examining the information from Appendix Table A-1, the following conclusions are offered for discussion.

- i) Use of excise tax initiatives to intervene on behalf of sustainability are commonplace.
- ii) The principal benefits of such intervention are to deter unsustainable behavior and to cover costs of pollution control, monitoring and rehabilitation.
- iii) The trend toward greater use of such price intervention initiatives on behalf of a more sustainable future in British Columbia, and toward raising of environmental prices where appropriate, will strike a better balance between the economy and the environment in the province. However, setting of environmental prices "at full value" is beyond both the informational and financial capabilities of Provincial administrators. Thus, the realistic goal here is "improvement", not "optimal solution".
- iv) Appendix Table A-1 offers a broad menu of potential initiatives. It will be up to Provincial experts, in association with industry and the public, to prioritise this menu, and select the action items of immediate merit. At the same time, such a selection effort should proceed comprehensively. Judged by international standards, B.C. has led in some areas, but has catching up to do in others. Selection of just one or two pricing initiatives at a time may not be sufficient to stem the tide of declining resource capability and increasing pressure on the environment that we face.
- v) Finally, virtually all of the new pricing initiatives being developed in the world today discriminate in favour of sustainability - tying tax structure progressively to either level of environmental performance, or time frame for achieving greater sustainability, or both. This progressiveness offers choice to both businesses and the consumer, and hastens our transition toward a more sustainable future. Incorporation of such differential rate structures should therefore be pursued across the board as a fundamental tenant of tax policy in the Province.

2. Pricing of Pollution Permitting Systems

Pricing of pollution control permits offers another vehicle for direct intervention in economic cost and price structures. In this sense, the conclusions reached immediately above with respect to excise tax interventions also apply here. Stone (1990b) provides a useful analysis of both the existing British Columbia permitting system, and of emergent emission control systems in Europe, Japan and the United States. He reports that in British Columbia, permit fees have tended to be flat rate, differentiated only by industrial classification and volume of pollutant. Fee structures in the other jurisdictions reviewed by Stone tend to be more progressive with respect to sustainability, generally increasing with relative concentration of noxious elements being emitted. Stone concludes with seven "lessons learned" from other jurisdictions. They complement the conclusions reached in preceding discussion on excise taxes.

- i) Fees are used to complement a regulatory permit system, not in lieu of one;
- ii) Fees vary with quantity and type of pollutant discharged;
- iii) Measurement of pollutants in each jurisdiction is simplified.
- iv) Fees vary geographically and with circumstance, within each jurisdiction.
- v) Fees have started low and increased progressively over time.
- vi) Fees are used to finance abatement measures undertaken by municipalities and in some cases by industries.
- vii) Fees have contained a hardship relief clause.

Taken together, these conclusions, and those presented on the previous page, may offer a framework to guide more effective environmental pricing to support sustainability goals in B.C.

V. Using Market Weighting Systems to Improve Sustainability

The New York Department of Public Service has initiated another potentially useful approach to intervening in economic markets on behalf of greater sustainability. In evaluating utility bids to develop new power sources for New York state, they not only consider power cost, but also use a system of environmental scoring (Putta, 1990). Environmental characteristics of the various power generation proposals are considered with respect to impacts on air, water and land. Within each of these categories, specific weighted attention is given to impacts of particular concern. For example, sulfur oxides, nitrogen oxides, carbon dioxide and particulates receive explicit scores under the air emissions category. Finally, using economic analysis re. cost of alternative environmental control technology the Department of Public Services converts these environmental scores to cents/kwh, and incorporates them directly into their low bidder selection process.

The B.C. Ministry of Energy, Mines and Petroleum Resources' Energy Efficiency and Technology Program provides an early prototype for some elements of such a system (see Table 2, following). The New York system is of interest in that it mitigates economic penalties associated with more sustainable behavior by firms, yet leaves those firms choices respecting the tradeoffs each will make between control of cost and of environmental impact. It incorporates environmental cost into its equations via consideration of the economics of alternative control technology, but, with most analysts, stops short of a "full cost" estimate of environmental damage. At the same time, it introduces a societal

choice variable into analysis via its weightings between environmental impact parameters. It may thus represent a prototype for the kind of "best practical mix" of economic and societal choice considerations that were discussed earlier in this paper. This program has just been initiated. It may be beneficial to monitor it during its early stage, for possible adaptation in British Columbia.

VI. Subsidies to Promote Greater Sustainability in British Columbia

The use of direct economic incentives, or subsidies, to promote desired societal goals has a tradition as old as British Columbia. Conversely, concern for sustainability of B.C.'s economy and environment is newer. As this concern has emerged, government has taken a number of specific actions to reflect these new concerns. Selected specific examples are listed in Table 2 (pg. 18).

Examining information in the table, it appears that important initiatives to improve sustainability have been taken in the Province, but that they have tended to be specifically focussed, and responsive to particular needs and issues that have been identified. Conversely, the evidence does not suggest that any comprehensive examination of the Province's taxation and subsidy system, with a view to increasing sustainability of the Province's resources has been undertaken. I suspect that such a review, which should both identify opportunities, and instances where the present system may be encouraging unsustainable economic activities, would be very beneficial in furthering the dual objectives of a sustainable economy and environment.

Table 2
Selected Environmental Subsidy Programs in B.C.

<u>Program</u>	<u>Description</u>
1.Exemption from retail sales tax. (Under Social Service Tax Act.)	-Granted to farmers, fishermen and aquaculturalists; also to energy conservation products.
2.Other Social Service Tax Act initiatives.	-Exempts prescribed environmental enhancement items from the tax, including farm use of biological control agents (1990).
3.Municipal Act	-Permits exemption from assessed property value of improvements or land used exclusively to control or abate water, land or air pollution.
4.Federal Accelerated Capital Cost Allowance Program	-Provides 3 year writeoff of capital costs incurred in controlling air & water pollution. B.C. shares in this program.
5.Agriculture Land Development Agreement	-Low interest loans to projects with environmentally sound drainage, irrigation, land clearing & animal waste disposal practices.
6.Energy Efficiency & Technology Program (E,M&PR)	-B.C. Hydro can allow up to a 15% price premium for environmentally beneficial projects, when acquiring privately generated energy.
7.Silviculture Program (MOF)	-Funding of contract work to restock forests.
8.Municipal Solid Waste Management Program MOE)	-Provides financial assistance to municipalities to reduce municipal waste by 50% by the year 2000.

VII. Practical Constraints on Progress Toward Greater Sustainability

1. The Cost of Sustainability

Under traditional systems of economic incentive, natural resource exploitation rates have often focussed on the short to medium term, and developed an attendant capital infrastructure. Movement toward greater resource sustainability may require that some firms retool, or otherwise change their business practices- and this will involve costs in the short term. Some prior investments may not be easily liquidated, employees may need to be retrained, some communities may need to be re-structured or relocated. Programs to improve sustainability will need to address these concerns (termed "frictional costs" by economists) explicitly if they are to succeed.

At the same time, evidence from British Columbia and elsewhere (Stone, 1990a, 1990b) makes it clear that the direct cost of extracting resources and coping with pollution will increase over time, with or without a policy of sustainability.

From these observations, we conclude that the contribution of a program of sustainability will focus chiefly on our view of a livable future, not on marginal gains in the present. In the immediate term, practical economic reality dictates that adjustment assistance will be a critical transitional requirement. Without such adjustments, British Columbia's economy and its citizens will likely see acceleration of the trends toward greater resource extraction costs and increased pressures on the environment that have motivated the Round Table.

2. How Foreign Markets May Affect Sustainability

Exports play an important role in the British Columbia economy. B.C. firms must not only compete within the province, but within Canada and around the world. International competitors may have very different cost functions for their products - particularly with respect to labor and the costs of required environmental controls. Such environmental costs are receiving increasing attention from the private sector. Companies will often relocate between countries or regions to achieve a pricing advantage for their product. The European Economic Community, for example, is giving explicit attention to standardization of environmental requirements within the context of their trade compacts and agreements. Thus, analysts considering economic mechanisms to attain greater sustainability must often give consideration to potential policy impacts in several differing markets, not just in British Columbia. Development of a strategy to deal effectively with these national and international marketing issues will consequently be an important element of B.C.'s program to improve sustainability in the Province.

3. Symmetry of Interest between British Columbia and National and International Economic Partners

Corporate activity in British Columbia reflects a range of Provincial, Canadian and foreign interests. This adds additional complexity for the economic model that would predict improved sustainability due to economic initiatives. Not only must such a model deal with multiple markets ((2) above), but it must pose the question: "Which interests are likely to affect the market, and is the model realistic enough to predict what their actual

behavior will be?" One example will illustrate my caution. A regionally owned timber company in northern California was recently purchased by a holding company based in Texas, whose objective was to drive up the price of their shares on the New York Stock Exchange. To achieve this, they greatly accelerated the timber cut rate to increase cash flow. This action, rational from their shorter term corporate perspective, is forecast to strip hundreds of jobs from the area over the medium to longer term, and has thrust loggers and environmentalists into a joint effort to sustain the area's forest resource capability. It can be noted that the economic model that would have predicted such corporate behavior is a completely different one than would have dealt with a sustainable balance between forest production and environmental protection in northern California - both in terms of objectives and in perspective of time frame.

4. Principal Constraints to Sustainability Programs - A Summary

Considering the observations of this section, together with prior discussion, I suggest that the principal constraints on how far we can go with economic mechanisms to increase sustainability are:

- i) the degree to which each economic incentive actually promotes sustainability;
- ii) the degree to which the overall sustainability program impairs the competitiveness of B.C. firms in the short term, particularly with respect to international markets and investment in the Province.
- iii) the degree to which available revenue in the Province can finance the move toward greater sustainability for both B.C.'s economy and environment.
- iv) the degree to which we can economically quantify environmental concerns.

VIII. An Economic Menu to Improve Sustainability in British Columbia

This final section draws on the information and conclusions developed in this paper, to offer a tentative menu to the Round Table to get started. This initial strategy incorporates three key perceptions.

- The program to achieve sustainability must be far reaching. Just "doing a few things at a time" will be inconsistent with the urgent concerns about resource capability and environment that created the Round Table, and risks the possibility that our efforts will be overrun by adverse environmental events.
- It follows from the above, that the program of economic mechanisms initiated to improve sustainability should be comprehensive. Permit marketing systems and fees, excise taxes, environmentally weighted systems for making economic decisions and the Province's fiscal system for encouraging and discouraging economic behavior in general, all can make important contributions to sustainability. Elements of each should therefore be incorporated in initial sustainability strategies.
- It does not follow from the above that "everything should be implemented at once". Some potential initiatives are well defined, and we likely possess sufficient knowledge to accurately predict beneficial results. Others are more obscure, and will require further study and workup. A third category of actions involve the underlying economic conditions, in British Columbia, nationally and internationally, that will facilitate or impede B.C.s sustainability initiatives, and may fall under the category of policy research and development.

Following these perceptions, I will list action opportunities that seem evident from the discussions of this paper. Undoubtedly, such opportunities can be considerably expanded on and refined by members of the Round Table.

1. Develop, Implement and Test several "Emission Trading Systems" in British Columbia

Evidence from elsewhere suggests that such systems benefit both the economy and the environment in situations where emissions must be controlled and/or reduced. Candidate systems could include:

- i) an air quality emissions system for Greater Vancouver;

- ii) an SO2 emissions program for Vancouver Island;
- iii) A province-wide CO2 and NOX emissions control program to address Provincial, national and international concerns over global warming.

To target medium term opportunities, initiate research to:

- iv) Evaluate a Colorado-type water emissions trading system as part of the sewage control buildout strategy of the Capital Regional District.

2. Monitor and Conduct Research to Identify Potential Benefits and Costs of "Tradeable Harvest Permit Systems" in B.C.

- v) Monitor fisheries experience by federal fisheries and other jurisdictions.
- vi) Initiate a cooperative study of the potential for permit markets that would benefit both the economy and the environment in B.C.'s forest industry. At an intuitive level, major opportunities may exist here to take some heat off present economy/environment difficulties.

3. Implement Rate Structures that are Progressive with Respect to Sustainability throughout B. C.'s System of Financial Incentives and Disincentives

- vii) Revise B.C.'s "Waste Discharge Permit Fees" to recognise differential loadings of key pollutants, and to tie overall rate structure to a pollution control attainment schedule. This will reflect best international practice, and provide strong incentive to achieve necessary pollution control objectives. (Recent gov't. announcement indicates initiatives on this issue.)
- viii) Comprehensively review B.C.'s other excise taxes and fees, and build progressiveness with respect to sustainability into rate structures wherever possible.
- ix) Comprehensively review B.C.'s full system of taxes and incentives and develop a revised fiscal policy consistent with emerging commitment to a more sustainable economy and environment. This process may require differentiation by Provincial sub-region.

4. Evaluate the Potential for Environmentally Weighted Pricing Processes in British Columbia

- x) Monitor the experience of the New York Department of Public Service, and analyze the benefits and costs of similar systems in B.C. As noted, B.C. Hydro already

employs a more rudimentary system of this type. Other potential applications of such an environmentally weighted pricing system include:

- decisions on project options by the B.C. Utilities Commission;
- awarding of highway and other construction contracts by the Province;
- a broad array of institutional decision-making where economic and environmental objectives must be balanced.

5. Develop a Lead Role for B.C. re. National and International Sustainability of the Economy and the Environment

Because of B.C.'s national and international trading position, it is imperative that sustainability advance nationally and internationally, as well as in British Columbia.

xi) British Columbia should develop an initiative to have sustainable standards for the economy and the environment built into international trade agreements such as GATT and the Canada/US free trade agreement. In particular, countries that capitalize on less sustainable economic and environmental actions should be subject to "dumping" duties. Environmental standards should be based on the ambient quality of air and water that each jurisdiction attains, so that countries that have grossly polluted their air and water could not obtain competitive advantage over B.C.

xii) British Columbia should initiate a similar study of agreements affecting trade within Canada.

6. Develop a Provincial System of Accounts that Enables the Province to Gauge how Swiftly it can Move toward a More Sustainable Economy and Environment, while Continuing to Provide other Essential Services

xiii) Incorporate both environmental values, and the costs of sustaining them, into our system of Provincial and National accounts.

7. Improve the Comprehensiveness and Accuracy of Non-Market Value Information in British Columbia

xiv) A coordinated study of key non-market values important to the sustainability dialogue should be commissioned. It should be pursued in both economic terms, and via the weighted value approach being tested in New York state.

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Appendix Table A-1
A Summary of Past Experiences with Excise Taxes
Affecting the Environment

<u>Excise Tax</u>	<u>Jurisdiction</u>	<u>Status</u>
I. CONSUMER LEVEL EXCISE TAXES		
A. Leaded gasoline tax.	1. British Columbia (1987)	A \$.02/litre tax to raise est. \$37M.
	2. Manitoba (1985 & 1988)	A \$.009/litre tax, incr. to \$.018/ litre in 1988.
	3. Ontario (1988)	A \$.03/litre tax to raise est. \$39M.
	4. New Brunswick (1989)	A \$.022/litre tax to make the leaded tax equal to or more than unleaded tax.
	5. Newfoundland (1989)	A \$.015/litre surtax.
	6. Saskatchewan	A \$.02/litre tax.
	7. Canada (1987 & 1989)	A \$.01/litre surtax.
	8. Denmark	A \$.0692/litre surtax.
	9. Finland	A \$.0723/litre surtax.
	10. Germany	A \$.0462/litre surtax.
	11. Netherlands	A \$.0262/litre surtax.
	12. Norway	A \$.0631/litre surtax.
	13. Sweden	A \$.0338/litre surtax.
	14. Switzerland	A \$.0446/litre surtax.
B. Tire Taxes	1. British Columbia (1990)	A \$3.00/new tire tax, est. to raise \$7.5M in 1990/91.
	2. Ontario (1989)	A \$5.00/tire tax, est. to raise \$40M/yr.
	3. Wisconsin	A \$2.00/tire tax.

Table A-1 Continued
A Summary of Past Experiences with Excise Taxes
Affecting the Environment

<u>Excise Tax</u>	<u>Jurisdiction</u>	<u>Status</u>
B. Tire Taxes Cont'd.	4. Washington, Oregon, Maine, Minnesota, Oklahoma, Florida.	A \$1.00/tire tax.
C. Lubricating Oil Taxes	1. Rhode Island (1990)	A \$.053/litre tax on lubricating oil to aid in disposal.
	2. Florida (1986)	A \$.05/gallon tax on motor or other lubricating oil.
	3. Germany (1969 & 1976)	A comprehensive contractor-based system for collection & disposal based on a user fee charge of \$6.65/kg.
	4. Netherlands (1976)	A \$1.00/1000 litres tax on producers & imports. Replaced by a general fuel charge in 1988.
	5. France (1981)	A \$9.23/tonne tax funds a system similar to Germany.
	6. Italy (1985)	A \$4.92/tonne tax.
	7. Finland (1987)	A \$44.62/tonne tax.
	8. Norway (1988)	A \$.09/litre tax.
D. Beverage Container Handling Fees & Taxes	1. Alberta (1972)	Handling fee of \$.015/container.
	2. Manitoba (1989)	Tax of \$.05/aluminum beer can & \$.10/ non-refillable beer bottle.
	3. Saskatchewan (1988)	A \$.02/non-refillable container handling fee.
	4. Ontario (1989)	A \$.05/alcoholic beverage container tax, for non-deposit/non- recycled containers.

Table A-1 Continued
A Summary of Past Experiences with Excise Taxes
Affecting the Environment

<u>Excise Tax</u>	<u>Jurisdiction</u>	<u>Status</u>
D. Beverage Container Handling Fees & Taxes Cont'd.	5. Prince Edward Island (1977)	A \$.03 to \$.10 handling fee per container.
	6. Rhode Island (1984)	A tax of \$.04/case.
	7. New York (1983)	A \$.015/container handling fee.
	8. Florida, Vermont, Delaware	A tax of 20% of refund value.
	9. Norway (1974)	A 30% non-refillable container tax.
E. Litterable Products Taxes	1. Washington (1971)	A .015% tax.
	2. Nebraska (1981)	A .015% tax.
	3. New Jersey (1986)	A .03% retail tax and .025% wholesale tax.
F. Energy Conservation Taxes on Durable Goods	1. British Columbia (1980 to 1983)	A progressive social services tax levy of 2% for fuel efficient cars and 6% for fuel inefficient cars. Repealed in 1983.
	2. Ontario (1989)	A progressive tax of between \$600 and \$3,500 per car, based on fuel efficiency ratings.
	3. Canada (1974 ff)	A progressive tax based on automobile weight, plus levies on large horsepower pleasure boats, private aircraft & heavy motorcycles. A levy on autos with air conditioners was added (1976). Taxes re. motor boat engines, private aircraft & motorcycles was repealed in 1978.

Table A-1 Continued
A Summary of Past Experience with Excise Taxes
Affecting the Environment

<u>Excise Tax</u>	<u>Jurisdiction</u>	<u>Status</u>
F. Energy Conservation Taxes on Durable Goods Cont'd.	4. United States (1984 ff)	A progressive tax on automobiles from \$200 to \$3,850, based on fuel efficiency.
G. Battery Taxes	1. British Columbia (1990)	A battery disposal tax of \$5.00/ new lead acid battery, est. to raise \$2.3M in 1990/91. Handicapped vehicles & rebuilt/reconditioned batteries exempt.
	2. Washington, & Minnesota (1989)	A \$5.00/lead acid battery tax where a used battery is not turned in.
	3. Maine, Florida (1990/1986)	A \$1.00/lead acid battery tax is charged.
	4. Sweden (1987)	A \$4.95/kilogram of household battery sold tax. Applies to batteries containing mercury & cadmium.
	5. Norway (1989)	A \$.40/household battery tax. Applies to batteries containing mercury and cadmium.
H. Disposable Diapers	1. British Columbia (1990)	Removed the exemption on the 6% social services tax. Est. to raise \$2.0M in 1990/91.
I. Newsprint Taxes	1. Florida (1989)	A \$.10/ton tax, which exempts recycled newsprint. The tax will either rescinded or increased in 1992, based on whether a recycling rate of 50% is achieved.
	2. Wisconsin (to start in 1992)	A progressive tax based on recycled fibre content.

Table A-1 Continued
A Summary of Past Experience with Excise Taxes
Affecting the Environment

<u>Excise Tax</u>	<u>Jurisdiction</u>	<u>Status</u>
J. Packaging Material Taxes	1. Florida	If by 1992 a 50% recycling rate on glass, plastic, aluminum, plastic coated paper or other metal is not achieved, a \$.01/container "advanced disposal fee" will be implemented.
	2. Italy (1989)	A \$.09 tax per non-biodegradable plastic shopping bag.
K. Major Appliance and Electronic Product Taxes	1. Maine (1990)	A \$15.00/item tax to fund solid waste management.
L. Noise Related Taxes	1. France (1984)	A progressive tax on aircraft landings, based on noise level of the aircraft. Repealed in 1987.
M. Miscellaneous Product Taxes	1. Rhode Island (1990)	1a. A \$.0264/litre tax on antifreeze. 1b. A \$.0025/gallon tax on organic solvents. 1c. A \$3.00 tax on new motor vehicles. These products were all considered to be "hard to dispose of".
II. <u>INDUSTRY LEVEL EXCISE TAXES</u>		
N. Superfund Taxes on Petroleum	1. United States (1986 ff)	An \$.082/barrel tax on domestic crude & an \$.117/barrel tax petroleum product imports to support EPA's Superfund.

Table A-1 Continued
A Summary of Past Experience with Excise Taxes
Affecting the Environment

<u>Excise Tax</u>	<u>Jurisdiction</u>	<u>Status</u>
O. Superfund Taxes on Industrial Chemicals	1. United States (1987 ff)	A tax from \$.24 to \$4.87 per ton on 42 different industrial petrochemicals and inorganic chemicals.
P. Superfund Hazardous Waste Tax	1. United States (1983)	A tax of \$2.13/dry weight ton of hazardous waste. Later repealed.
Q. Environmental Tax on Business Income	1. United States (1985)	A tax of 0.12% on taxable corporate income over \$2M.
R. Chemicals Tax	1. Washington (1988)	A 0.7% tax on the wholesale value of hazardous chemicals.
S. Taxes on Fuels	1. United States (1987)	A \$.01/gallon tax to deal with problems of leaking underground storage tanks.
	2. Netherlands (1989 & 1990)	2a. A progressive tax on fuels to reduce SO ₂ emissions, with rebates to firms undertaking desulphurization, & higher tax rates for leaded gasoline.
		2b. A CO ₂ tax on fossil fuels.
	3. Norway (1971 ff)	A fuel tax with a base rate of \$42.00/1,000 litres, with rate surcharges tied to sulphur content. Rebates are provided for sulphur emission control measures.
	4. Sweden (1984)	A tax of \$27.32/cu. meter of mineral oil.

Table A-1 Continued
A Summary of Past Experience with Excise Taxes
Affecting the Environment

<u>Excise Tax</u>	<u>Jurisdiction</u>	<u>Status</u>
T.Oil Shipping Taxes	1.Canada (1972 ff)	A \$.30/tonne tax. Not presently implemented by Canada.
	2.United States (1978)	A \$.03/barrel tax on oil production from the U.S.'s outer continental shelf, to pay damages from those operations under certain conditions.
	3.Maine (1985)	A terminal facility levy of from \$.015/barrel to \$.005/barrel, depending on refining level.
	4.Florida (1970)	A \$.02/barrel tax, which may be increased to \$.10/barrel in event of a catastrophic discharge.
	5.Finland (1972)	An "oil protection" levy of 100 marks/1000 tonnes of oil imported.
U.Mining Taxes	1.United States (1977)	A rate of \$.55 to \$1.00/ton of coal extracted to take care of black lung sufferers.
	2.United States (1977)	A reclamation fee of \$.35/ton (surface pit) and \$.15/ton (underground) for land & water reclamation of coal mines. The rate is limited to 10% of the value of the coal.
V.Pesticide Taxes	1.Sweden (1984)	A \$1.00/kilogram of active ingredient tax.